A FRAMEWORK FOR EVALUATING PROPOSALS FOR SCIENTIFIC ACTIVITIES IN WILDERNESS

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Abstract

This paper presents a structured framework for evaluating proposals for scientific activities in wilderness. Wilderness managers receive proposals for scientific activities ranging from unobtrusive inventorying of plants and animals to the use of chainsaws and helicopters for collecting information. Currently, there is no consistent process for evaluating proposals, resulting in confused and frustrated scientists and managers, as well as lost opportunities for gaining valuable information about a wilderness. The framework presented here is based on two premises: that both benefits and impacts are fully considered, and that communication between scientists and managers occurs at the beginning of the evaluation process.

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evaluation process. Improved up-front communication between managers and scientists increases the likelihood that (1) impacts from scientific activities on wilderness values will be reduced or mitigated, (2) managers will derive useful products from the proposed activities, (3) scientists will be given permission for their proposed activities, and (4) managers and scientists will have a better understanding of each others' concerns.

While no single evaluation process will work in every situation, especially in cases that have become contentious and politicized, a systematic evaluation process allows improved communication between managers and scientists and more defensible decisions.

Current Situation

Scientists and managers often fail to consider each other's context, needs and constraints. For example, scientists may not fully understand the philosophical basis of wilderness management and the impacts their activities may cause, and wilderness managers may not fully consider the potential benefits of a proposed activity to the broader system of natural areas nationwide (for example, Eichelberger and Sattler 1994). These different viewpoints, combined with the typically meager communication between scientists and managers, result in frustration and lost opportunities for both the advancement of science and wilderness protection (Peterson 1996).

Contributing to this lack of understanding and communication is inconsistency in how proposals for scientific activities are evaluated. Each of the four wilderness management agencies, and often administrative offices within these agencies, use different processes for evaluating proposals. Despite these differences, the following three screening questions, in various forms, are common to nearly all evaluation processes:

- Is the proposed activity necessary for the management of the area as wilderness?
- Is it necessary to conduct the proposed activity in wilderness?

Benefits and Impacts Filter and a Quality of Design Filter (fig. 1). The first filter helps determine if the proposed activity fits within the "minimum requirements" provision of the Wilderness Act and is compatible with other applicable legal, policy and planning documents for that wilderness. If the activity passes this filter, the second filter, composed of two stages, evaluates the relative benefits and impacts of the proposed activity. The first stage is a rapid assessment of benefits and impacts that classifies the proposed activity "approved to next filter," "denied" or "further evaluation needed." For proposed activities falling into the last class, the second stage is a comprehensive and in-depth evaluation of what the benefits of the activity are, who derives this benefit, what the ecological and social impacts are and whether these impacts can be prevented, minimized or mitigated. The third filter and last step in this process is to evaluate if the proposed activity is well-designed and capable of providing its intended outcome.

This framework includes all the elements that are necessary and sufficient to evaluate a proposed scientific activity. In some cases, this process will lead to quick decisions, while in other cases, the process will identify the need for a comprehensive evaluation that will take longer and be much more difficult. Subjective judgements are an integral part of evaluating proposed activities in many cases, especially in those needing a comprehensive evaluation of benefits and impacts. The proposed framework makes these judgments and their underlying assumptions more explicit, and allows their merits and limitations to be openly discussed. In addition, if a structured process is used to evaluate proposals, scientists and managers can discuss how the proposal will be evaluated *before* it is submitted. If scientists understand this process and that both benefits and impacts of their proposed activity will be rigorously evaluated, they will strive to minimize the impacts and maximize the benefits of their work. This structured process provides a sound basis for improved communication between managers and scientists, leading to scientific activities that may be tailored to maximize their benefits to

an enduring resource of wilderness," and these benefits are "recreational, scenic, scientific, educational, conservation, and historical use" (Sections 2(a) and 4(b), respectively, of the Wilderness Act of 1964). The broader view typically considers scientific activities to be an integral part of wilderness.

To help resolve these problems, the USDA Forest Service is developing guidelines for determining whether a proposed activity is the minimum required for administration of an area as wilderness. The Legal and Policy Filter shown in figure 2 is modified from the Forest Service's draft "Minimum Requirement Determination Guide" for the specific case of scientific activities. In this filter, the first three questions are used to determine if an activity must be approved. However, even if an activity is approved via any of these first three questions, negotiation may still be used to reduce and mitigate impacts. Proposed activities that pass to the fourth question require further evaluation based on eight additional questions that yield subjective "yes/no" answers. After these questions are answered, an individual determination is made about denying the activities because they fail to meet legal and policy standards, or approving them to be evaluated in the remaining two filters.

Benefits and Impacts Filter

If a proposed activity passes through the Legal and Policy Filter, the potential benefits and impacts of the activity are evaluated. Most of the processes currently used to evaluate proposals for scientific activities, especially within the Forest Service, largely focus on potential impacts and either ignore or underrate potential benefits. Focusing on impacts stems from the traditional view that scientific activities are primarily an intrusion in wilderness. This traditional view should be evaluated against the view that wilderness offers a unique opportunity to learn about the structure and functioning of both ecological and social systems in relatively pristine environments, and that this information may be of great value to wilderness managers, natural

and sight of motorized equipment or visual impacts from tags, markers and other equipment that affect a primitive wilderness experience. Social impacts also include philosophical concerns about a proposed activity that may, for example, set a precedent for violating the untrammeled character of a wilderness. For example, to some people, using helicopters to access remote locations for lake or vegetation monitoring, or for placing radio collars on threatened and endangered species such as wolverines, is a clear violation of the spirit and letter of the Wilderness Act.

Fundamental questions asked about all impacts include: (1) How big an area will be affected? (2) How intense will the impact(s) be? (3) How long will the impact(s) last? (4) Can the impact(s) be mitigated, both during the activity and after it is completed? In many, if not most cases, there will be no precise or hard information on impacts. Relying on subjective judgment is appropriate in such cases as long as these judgments and underlying assumptions are made explicit so their merits and detriments can be openly discussed and debated.

The first, rapid assessment stage of benefits and impacts is based on a simple two-way "benefits-impacts matrix" (fig. 4). The purpose of this matrix is to rapidly identify and approve proposed activities that provide large benefits with little impact and identify and deny those activities that offer little or no benefit but cause considerable impacts. Also, it is suggested that proposed activities which offer few or no direct benefits and cause little impact be readily approved (Graber 1988). Some may argue that the latter should be denied because they do not fulfill the necessary minimum requirements discussed earlier and that all unnecessary activities further trammel an area. In contrast, these activities are relatively benign, they may provide baseline information with unanticipated later usefulness, and they may fit under the "recreational, scenic, scientific, educational, conservation, and historical" uses described in the Wilderness Act of 1964.

in this way should make apparent the specific impacts that are of greatest concern, allowing explicit discussions about accepting these impacts or how to minimize or mitigate them.

Quality of Design Filter

The outcome from the indepth evaluation of benefits and impacts is to either deny the proposed activity or to approve it to the last Quality of Design Filter. The purpose of this last filter is to ensure that the proposed work is adequately designed to meet its intended goals and objectives. It may be the most challenging for managers if they are not trained in scientific methods of research design, sampling theory and statistical analysis. Managers have four options to assess the quality of the proposed activity: (1) Review the design quality of the proposal themselves; (2) ask their in-house science staff to review the proposal; (3) ask outside scientists for review; or (4) assume that the proposal is sufficiently well-designed that no review is needed. The drawbacks to the first three options are the staff time and funding needed to review proposals. While the fourth option may appear specious, some national-level cases such as the Forest Health Monitoring program are developed with rigorous standards and don't need to be reviewed for design quality.

The outcome from this Quality of Design Filter is to deny the proposed activity, approve it or negotiate with the proposer about how to maximize the benefits and how to reduce or mitigate impacts from the proposed activity.

Conclusions

This framework provides a process for systematically and comprehensively evaluating the benefits and impacts of proposals for scientific activities in wilderness. Fully considering the benefits and impacts of a proposed activity, and making all judgments and assumptions explicit, allows informed and defensible decisions. Furthermore, a systematic and comprehensive framework provides the basis for consistent and explicit communication between managers and

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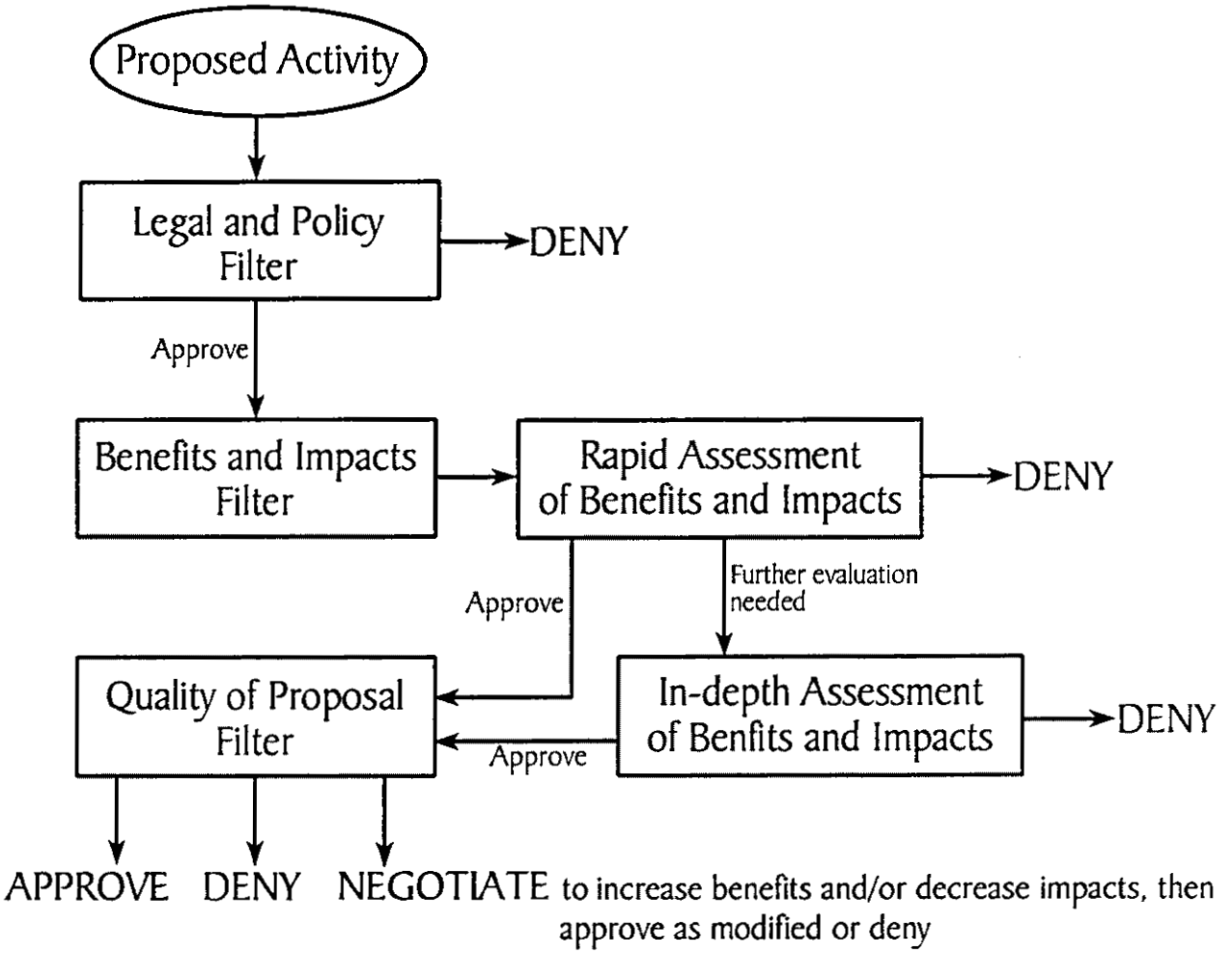
Parsons, D.J., and D.M. Graber. 1991. Horses, helicopters and hi-tech: managing science in wilderness. Pages 90-94 *in* Preparing to Manage Wilderness in the 21st Century (P.C. Reed, compiler). USDA Forest Service General Technical Report SE-66, Southeastern Forest and Experiment Station, Asheville, NC.

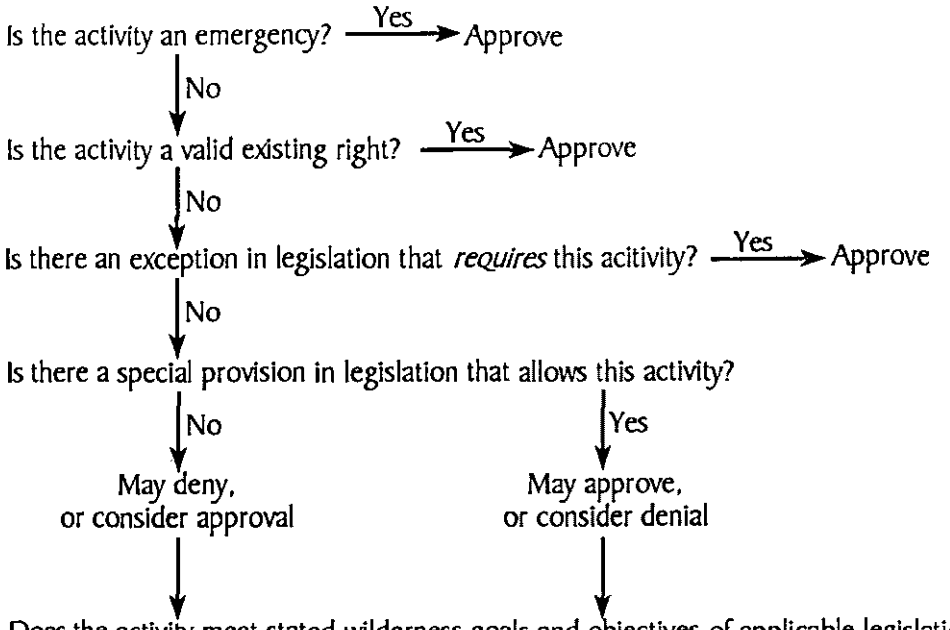
Peterson, D.L. 1996. Research in parks and protected areas: forging the link between science and management. Pages 417-434 *in* National Parks and Protected Areas: Their Role in Environmental Protection (R.G. Wright, J. Lemmons, editors). Blackwell Science.

FIGURE 6. Example of an in-depth evaluation of the impacts from proposed *fire history reconstruction research* in a wilderness. This example is not exhaustive and only shows representative impacts within each of the three broad types of impacts. Parenthetical statements below each impact represent judgements of the amount of area affected and the intensity of impact. The circled numbers shown here reflect these judgements of impact based on the numerical categories shown in the in-depth impacts matrix (Figure 5). The judgements of impacts and numerical ratings shown here are only representative and do not reflect actual ratings.

FIGURE 7. Example of an in-depth evaluation of the impacts from proposed *trampling research* in a wilderness. This example is not exhaustive and only shows representative impacts within each of the three broad types of impacts. Parenthetical statements below each impact represent judgements of the amount of area affected and the intensity of impact. The circled numbers shown here reflect these judgements of impact based on the numerical categories shown in the in-depth impacts matrix (Figure 5). The judgements of impacts and numerical ratings shown here are only representative and do not reflect actual ratings.

FIGURE 8. Example of an in-depth evaluation of the impacts from proposed *forest health monitoring* in a wilderness. This example is not exhaustive and only shows representative impacts within each of the three broad types of impacts. Parenthetical statements below each impact represent judgements of the amount of area affected and the intensity of impact. The circled numbers shown here reflect these judgements of impact based on the numerical categories shown in the in-depth impacts matrix (Figure 5). The judgements of impacts and numerical ratings shown here are only representative and do not reflect actual ratings.


Proposed Activity
Legal and Policy Filter
DENY
Approve
Benefits and Impacts Filter
Rapid Assessment of Benefits and Impacts
DENY
Approve
Further evaluation needed
Quality of Proposal Filter
In-depth Assessment of Benfits and Impacts
DENY
Approve
APPROVE
DENY
NEGOTIATE
to increase benefits and/or decrease impacts, then approve as modified or deny



Does the activity meet stated wilderness goals and objectives of applicable legislation, policy, and specific management plans?

YES NO

Is the activity consistent with the desired future conditions of the area?

YES NO

Does the activity support wilderness as a whole and all wilderness values?

YES NO

Does the activity avoid dominating natural conditions and processes?

YES NO

Does the activity avoid reducing opportunities for solitude or a primitive and unconfined type of recreation?

YES NO

Does the activity avoid permanently occupying or modifying the area?

YES NO

Does the acitivty contribute to long-term positive effects on wilderness values?

YES NO

Were wilderness values placed above convenience, comfort, and economic or commercial values?

YES NO

Figure 2

Type of Activity	Potential Beneficiaries		
FIRE HISTORY RECONSTRUCTION	(Individual Wilderness)	Region	All Natural Resource Lands
TRAMPLING RESEARCH	Individual Wilderness	(Region)	All Natural Resource Lands
FOREST HEALTH MONITORING	Individual Wilderness	Region	(All Natural Resource Lands)

Figure 2

IMPACTS	BENEFITS		
	Few	Some	Many
Few	Approve	Approve	Approve
Some	??	??	Approve
Many	Deny	Deny	??

INTENSITY OF IMPACT	SIZE OF IMPACTED AREA		
	Small	Medium	Large
Small	1	2	3
Medium	2	3	4
High	3	4	5

TYPE OF IMPACT	AMOUNT OF IMAPCT				
BIOPHYSICAL IMPACTS					
Trampling of vegetation (small area, high intensity)	1	2	(3)	4	5
Soil erosion (small area, high intensity)	1	2	(3)	4	5
RECREATIONAL IMPACTS					
Sight of trampling plots (small area, high intensity)	1	2	(3)	4	5
Encounters with field crews (medium area, weak intensity)	1	(2)	3	4	5
SOCIETAL IMPACTS					
Precendent of purposeful trampling (large area, high intensity)	1	2	3	4	(5)

Figure 7

TYPE OF IMPACT	AMOUNT OF IMPACT				
BIOPHYSICAL IMPACTS					
Trampling of vegetation (small area, weak intensity)	(1)	2	3	4	5
Driving nails in trees (small area, weak intensity)	(1)	2	3	4	5
RECREATIONAL IMPACTS					
Sight of permanent plot markers (small area, medium intensity)	1	(2)	3	4	5
Encounters with field crews (medium area, weak intensity)	1	(2)	3	4	5
SOCIETAL IMPACTS					
Precendent of national-level monitoring in wilderness (large area, medium intensity)	1	2	3	(4)	5

FIGURE 3

TYPE OF IMPACT	AMOUNT OF IMPACT				
BIOPHYSICAL IMPACTS					
Sawcuts in living trees (small area, high intensity)	1	2	(3)	4	5
Trampling of vegetation (medium area, weak intensity)	1	(2)	3	4	5
Noise displacement of wildlife (medium area, medium intensity)	1	2	(3)	4	5
RECREATIONAL IMPACTS					
Sight of sawcut stumps (small area, high intensity)	1	2	(3)	4	5
Sight of chainsaws (small area, high intensity)	1	2	(3)	4	5
Noise of chainsaws (medium area, high intensity)	1	2	3	(4)	5
Encounters with field crews (medium area, weak intensity)	1	(2)	3	4	5
SOCIETAL IMPACTS					
Precendent of using chainsaws (large area, high intensity)	1	2	3	4	(5)

FIGURE 6